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Trapped Electron Mode Turbulence Optimization in HSX[1]
MICHAEL GERARD, BENEDIKT GEIGER, MJ PUESCHEL, AARON BADER, University of Wisconsin - Madison, JOHN SCHMITT, Auburn University, SANTHOSH KUMAR, University of Wisconsin - Madison, HSX TEAM — The Helically Symmetric eXperiment (HSX) is a neoclassically optimized stellarator that uses quasi-helical symmetry. Anomalous heat losses, attributed to turbulent fluxes, dominate outside the mid-radius, and may be reduced by changing the currents in individual coils to produce favorable magnetic geometries. The present configuration traps plasma particles in toroidally linked magnetic wells. However, these magnetic wells strongly overlap with regions of bad magnetic curvature, which has been linked to density gradient driven Trapped Electron Mode turbulence, and is a candidate process for explaining the anomalous heat transport. Several configurations have been identified with altered magnetic field structures that shift magnetic wells outside regions of bad curvature while maintaining good neo-classical confinement. Detailed modelling of the neoclassical transport using SFINCS, as well as results from linear gyrokinetic simulations from GENE will be presented and used to identify the most promising of these coil-current configurations. These configurations can then be studied using quasilinear and nonlinear gyrokinetic approaches to identify a few configurations that will be investigated in future experiments.

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